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25 YEAR RE-REVIEW

FORM NO. 51-4F
OCT 1951

(20)

Transportation of Personnel and Equipment to the USSR

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2. The dismantling of the Junkers Plants at Muldenstein, Dessau, was started at the time the Soviets took over the west bank of the Elbe River. Both plants were completely stripped of all equipment until only the masonry remained. There was no machinery nor piece of metal remaining when the dismantling operations were finished. Muldenstein, a plant in the vicinity of Dessau, where planes were produced serially, was dismantled first. Eight test stands were taken out of Muldenstein and transferred to Kuibyshev. The material dismantled from Dessau was divided between the plants at Tushino, Podberesje, and Kuibyshev. (Regarding the thoroughness of the dismantling operations--even the gas pipes and the electrical wiring were removed from the plants.) The assembly plant IFA, which was also part of the Junkers compound, was also completely dismantled. The Soviets kept several test stands in operation at Junkers, Dessau, while the German specialists were still on hand. These test stands were also dismantled after the deportation of the German specialists to the USSR. The dismantling operations were carried out by German personnel. [redacted] 25X1 The dismantling was done with great care and followed a definite system. All wooden boxes in which the equipment was packed were numbered on the outside so that the parts belonging together could be assembled again even by one with little experience. The boxes were lined with tar paper on the inside. They arrived in Kuibyshev in excellent condition with the exception of the boxes which were not unpacked until the fall of 1951; the contents of the latter were rusted. The deportation operations started at 2:30 on 22 Oct 46. [redacted] 25X1 hundreds of trucks were parked outside in the streets which were to take [redacted] specialists and 25X1 their families, and all the belongings of the deportees. The train left the same afternoon at about 5 o'clock. [redacted] 25X1 400 Junkers personnel were taken to Kuibyshev, another 100 specialists were taken to Tushino, while only personnel of the IFA plant, (an unknown number), were taken to Podberesje.

3. At the time of the group's arrival at Zavod No 2, the plant was entirely deserted with nothing there except the skeleton of the factory buildings. [redacted] 25X1 the remains on the scrap heaps indicated that it had been a plant for the production of precision mechanical equipment, such as airplane machine guns. [redacted] 25X1 an order to build up the plant to prepare for the production of airplane engines. The boxes which had been dismantled from the Junkers plant either had arrived or were in transit. Since they were numbered, they were distributed to the various buildings in which the equipment contained in the crates would be used. The first jobs assigned [redacted] were of the most 25X1 primitive type, such as repairing windows, and digging emplacements for the various instruments and machine tools. This work took about one week.

[redacted]

Construction of the Test Stands 25X1

4. After one week, the test stand operators were summoned to a place outside of the barbed wire enclosure. [redacted] ordered to level the ground for the erection of a number of test stands. The tools given were simply crow bars and shovels. Since the ground was frozen by that time, the work proceeded very slowly. There were about 40-45 men working on levelling and digging ditches for the foundations of the test stand buildings. The actual barrack type buildings in which the test stands were housed were not built by the Junkers Group but by Soviet penal laborers, mostly women. 25X1

5. There were two groups of test stands to be constructed. The first group, or the old test stands, consisted of four test units that were built up from the equipment taken from the Junkers or BMW plant in Germany. Stands No 2 and No 3 of the old group were erected first and became operational in April or May 1947. Stand No 1 and No 4 were added shortly. Stand No 2 and No 3 were first used for testing the BMW 003C engine. By the time Stand No 1 and No 4 were finished, the Junkers 012B was ready for test, and so testing was carried out on the 012B on Stands No 2 and No 4 late in 1947. Stand No 1 was then remodeled for compressor testing only and Stand No 3 was remodeled for the testing of a BMW 018. Work stopped on this engine in a short while. When the Junkers 022 became ready for testing in the spring of 1948, all stands were again remodeled for this engine. Stand No 1 remained a compressor test stand. No 3 remained a water brake test stand and Stand No 2 and No 4 were converted for testing of engines with props installed.

6. The second group of test stands to be constructed were the new stands. These were more elaborate than the first groups', but also consisted of four test units. Construction started in the spring of 1950--Stand No 1 was operational in September 1950. Stand No 2 became operational on 7 Nov 51 with the first test being on the 022M model. Work on Stand No 3 was started shortly after the tests had begun on the 022M model but was not near completion [redacted] in December 1951. Work had not started on Stand No 4 nor was it known when this would occur. Completion dates for Stand No 3 or No 4 are not known. Difficulties were reported on Stand No 3 because of material shortage and the release of qualified German supervisory personnel. 25X1

Accomplishments

7. Accomplishments of the Junkers Group at Zavod No 2:

(1) BMW 003: A BMW 003 was tested with the C model passing a state acceptance test in September or October 1947. The engine was removed from the test stands [redacted] 25X1

(2) JUMO 004: It was generally understood that the JUMO 004 was released to Kazan for series production. Designer Brandner, a German, was supposedly sent there to supervise the 004 production. Brandner returned to Kuibyshev in January 1947.

(3) JUMO 012: According to rumor, the 012B passed the state

 25X1

[redacted]

acceptance test successfully in November 1948, and then disappeared. Further rumored was that the 012 was released to Leningrad for series production. Nothing definite ever substantiated these rumors.

(4) JUMO 022: The first 22 engines of the 022 type, constructed at Zavod No 2, were essentially the same; the only changes incorporated in each succeeding engine were those deemed necessary or desirable resulting from further test and study. [redacted] there were no model letters given to the succeeding engines in the group-- nor [redacted] any designation given to them by the Soviets. The engine was known and referred to by both German and Soviet personnel as the 022. The engines were distinguished by a number (1 through 22) being painted on the engine itself. All 22 engines were constructed at Zavod No 2 and were completed by the end of 1949. 25X1 25X1

(a) The first engine was ready for testing in the spring of 1948 and the first acceptance test was attempted in the spring of 1949 with engine No 14 on old test stand No 2. This test failed when the propeller flew off. A second acceptance test was attempted in the fall of 1949 with engine No 20 and with engine No 21 in reserve. The later test was a success.

(b) Further tests were made on various engines. In the spring of 1950, engines No 15 and higher were converted to incorporate shorter combustion chambers and graphite rings to seal off the gap between the turbine blades and turbine housing. The greatest proportion of tests after this date involved engines with this modification. However, there were never any further acceptance tests made after the fall of 1949.

(c) In July 1951, Engines No 16 and No 17 or No 17 and No 18 were taken to Moscow, (exact place unknown) for test flights. Podberesje was mentioned in connection with the flight tests but this was strictly rumor. The two engines were supposedly installed in a "two engine airplane" along with two piston engines. No German personnel from Kuibyshev accompanied the engines. In September 1951, rumors circulated at Zavod No 2 that the flight tests were extremely successful and that the Soviets were very enthusiastic. The two engines did not return to Zavod No 2 [redacted] The two engines were of the types that had passed the acceptance test and did not incorporate the short combustion chambers nor the graphite rings. 25X1

(d) During 1951, work was concentrated on the reduction of the fuel consumption. There were many and varied tests on engines with closer tolerances, new fuel nozzles, different guide vane settings and various exact nozzle dimensions.

25X1

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 25X1

 [redacted]

(e) [redacted] in December 1951, an engine was about to be installed on Stand No 3 that would be completely instrumented. There were to be 580 connections to make. [redacted] 25X1 25X1

(f) The outstanding achievement made during 1951 was the reduction of the specific fuel consumption for the 022 to a phenomenally low value of 242 gr/HP/Hr. This value was obtained in April or May 1951 with several engines, all of which incorporated the short combustion chambers and the graphite rings. However, this value could not be obtained unless the graphite rings were in excellent condition. Should the graphite become dislodged or damaged, the specific fuel consumption would rise immediately. The 242 S f c was obtained only at cruise and rated power. At lower speeds and at take-off power it would rise slightly. [redacted] 25X1

(5) JUMO 022M: In September 1951, two 022M engines arrived at Kuibyshev. The engines were given the numbers 23 and 24. [redacted] 25X1 To the delight of the German personnel at Zavod No 2, the steel rings around the turbine wheels burnt when the engines were tested individually. These two engines were then converted to incorporate the graphite rings and prepared for test on New Stand No 3. The engines were coupled together in parallel through the reduction gear box and drove a common 4-bladed counter rotating propeller. On 7 Nov 51, the engines were mounted on the stand and the first test runs were made with them coupled together. There were many Soviet dignitaries present, and the engine failed to develop the desired 7500 rpm--it only reached 6500 rpm. The tests were discontinued and [redacted] further tests were not made [redacted] 25X1 when the M engines were coupled together, each could be operated individually, or together to produce a total of 13,000HP.

(6) JUMO 022K: In November 1951, an order was received at Old Stand No 3 to permit the stand to handle a new engine, designated 022K. One of the modifications was to provide for a pressure of 13 atmospheres at the last compressor stage. Other modifications under consideration were changes in the size of the oil lines. [redacted] 25X1 this was 25X1 from Deindert, a German engineer working on compressors. The 022K was at that time in the design stages and the target date for the completion of an engine was in June or July 1952. The engines were to be the same size and type as the 022 with the main difference being the compression ratio. [redacted] the K would reach a compression of 13 atmospheres and would produce 13,000 HP [redacted] 25X1 25X1 All other engineers speculated that clearances would be held to a minimum throughout. [redacted] 25X1 25X1

 25X1

[redacted]

Description of the JUMO 022 Turboprop Engine

8. General

The JUMO 022 was a conventional turboprop engine, which under certain conditions, was capable of producing 6500 HP with 300 kg of residual thrust and of obtaining a specific fuel consumption of 242 gr/HP/Hr at cruise and rated power. /Enclosure (A) is [redacted] an external view of the JUMO 022 engine. [redacted] 25X1

Estimated dimensions of the JUMO 022 are as follows:

Length:	4700 mm for Engines No 1 - No 14 4500 mm for Engines No 15 - No 22 after modification to short combustion chamber
Diameter:	(Max) 850 mm, taken at casing of turbine outlet
Weight:	Dry weight was 1100 kilograms Weight with accessories and prop was 1500 kg (Dry weight is the more accurate, since this was the condition in which the engine was received at old stand No 3.)
Center of Gravity:	Unknown. With a hoist attached only at the rear mount, it was difficult for one man to hold the engine level. [redacted] it was located at about the 13th compressor stage when prop was not attached. 25X1

9. Air Inlet

The air inlet was a bell shaped ring made of dural, supporting the prop reduction gear housing by six airfoil shaped struts. Its length was approximately 300 mm and the outer diameter at the air inlet was 800+ mm while at the point of attachment to the compressor the diameter was about 650 mm. The air inlet ring was attached to the compressor housing by a series of bolts every 8 cm around the butting flanges. One of the jobs performed on the test stands was to locate a pitot tube in the air annulus midway between the reduction gear housing and wall of the air inlet ring. Since it was imperative that the tube be located accurately [redacted] the distance between the housing and the wall was 148 mm's. The pitot tube picked up static pressure only and [redacted] a reading of 1400 mm of water was recorded on a manometer. 25X1 25X1

10. Compressor

(1) [redacted] opportunity to view the internal parts of the compressor occasionally [redacted] the compressor housing consisted of two welded steel casings separated by small struts permitting an air space of about 20 mm. The two casings or shells were made in halves to permit removal for access to the compressor. Located on the surface of the compressor housing were six equally spaced channels that ran axially the length of the housing and protruded about 150 mm above the surface of the housing. These channels enclosed all of the oil, fuel, and ignition lines of the engine that were located along the compressor. 25X1 25X1

[redacted]

(2) Located on the compressor housing over the 6th and 8th stage were two pressure relief valves approximately 100 mm in diameter. Initially, there were four such valves but further tests proved that only two were necessary. The two valves became a permanent part of all engines. 25X1
Their purpose was to relieve a pressure surge in the compressor built up on starting the engine or while running at low speeds. The valves were actuated by engine oil pressure built up to 12 atmospheres through a booster pump. Upon starting the engine, the oil pressure was slightly over 12 atmospheres and the valves remained open. When the engine reached a speed of 5400 rpm, the pressure dropped to below 12 atmospheres and the valves closed automatically. At speeds above 5400 rpm, the valves remained closed. On throttling back the engine, a slight hysteresis permitted the valves to remain closed until 5200 rpm was reached. Each valve was adjustable by a set screw acting on a spring load.

(3) The compressor itself consisted of 14 stages. It was repeated several times that the first 9 stages were made of light metal (Electron) while the last 5 stages were machined steel. Supposedly, the wheels and blades were made of the same material. [redacted] estimate the length of the 25X1
blades in the first stage as being 150 mm and the length of the blade in the last stage at about 60 mm. The number of blades is not known.

(4) [redacted] there were 15 stator rings and [redacted] each 25X1
stator ring was made up of two half rings held together by screws. The blades appeared to be steel stampings welded at each end to the stator rings. The following compressor instrumentation was standard for each test: 25X1

- P_1 - Wall static at entrance to the 1st stage
- P_2 - Wall static at exit of the last stage
- $P_2{}^o$ - Total head at exit of the last stage
- T_2 - Air temperature at exit of last stage taken by thermocouple protruding into air stream

[redacted] the following reading obtained while the 25X1
engine was at full power:

- P_2 - About 5.5 to 6 atm; obtained with pressure gauge
- T_2 - 180° - 220° C
- $P_2{}^o - P_2 = 0$ [redacted] 25X1

Discussions with Deindert, the aforementioned compressor specialist in the Experimental Department, revealed that graphite sealing rings and controllable blades were under consideration and might be attempted in the future.

11. Combustion Chamber

The combustion chamber consisted of a single annulus made up of 18 mm welded stainless steel sheets. The inner diameter of the annulus was 350 to 400 mm and the outer diameter was about 700 mm. Welded to the annulus were twelve entry ports from the compressor. Each entry port appeared as the head of a single combustion chamber. The body and cans were joined by welding. Each combustion can head had an air swirler at the

25X1

[redacted]

air entrance, and located in the center of the swirler was the fuel injector. [redacted] no information regarding the fuel nozzle other than the fact that they were made by one specialist who machined the parts on a lathe. Supposedly, no one else was capable of making a nozzle. Should any part of the combustion chamber fail, the whole chamber had to be replaced. However, the only difficulty experienced in this respect was the breaking of welds during the early tests. This trouble was eliminated after the arrival of the group of German engineers from Tushino in the fall of 1948. One of the engineers in the Tushino Group, was (fnu) Gerlach. Prior to his arrival, the combustion chamber had offered considerable trouble, not only with the breaking of welds, but with poor combustion characteristics. Gerlach added perforations to the combustion chamber heads. This eliminated the breaks and also cut down the specific fuel consumption. Another series of tests conducted by Gerlach dealt with injecting silver bronze into the fuel during a run. The silver bronze left markings on the combustion chamber walls and from a study of the markings, Gerlach was able to arrive at the ideal angle of fuel injection. The entire combustion chamber was enclosed in a sheet steel casing that permitted an air space of 20 mm between the chamber and the casing. 25X1

12. Turbine Assembly

(1) The turbine had three stages with the last rotor being approximately 850 mm in diameter to the blade tips and the first rotor 700 mm in diameter. [redacted] The three turbine wheels were attached to the turbine shaft by means of eight bolts that passed through the wheels and screwed into the shaft [redacted] The bolts were 20 - 22 mm in diameter at the location of the wheels. The first wheel butted against the shaft flange and the following wheels were separated by steel spacers that were 60 mm long and had an outside diameter of 34 mm. The last wheel was pulled up by means of lock nuts on the bolts. [redacted] the wheels could not have butted against each other at any point nor that the shaft extended through the wheels to relieve the torque and forces on the spacers. [redacted] the wheels were held by means of the eight bolts and am equally sure of the spacers between the wheels. 25X1 25X1 25X1 25X1

[redacted]

(2) The shaft was about 200 mm in diameter and hollow. Everyone who observed the shaft marvelled that the wall thickness was only 20 mm. The shaft extended through the center of the combustion chamber and attached to the compressor shaft by some unknown means which made disassembly difficult.

25X1

25X1

 [redacted] 25X1

(3) Each of the wheels was solid steel with a maximum thickness of approximately 50 mm. The maximum thickness was at the outer diameter where the blades attached to the wheel and also at the diameter of the eight bolt holes. Between these points, the wheel was machined to reduce weight. [redacted] 25X1

(4) The rotor blades were attached to the wheels by a pine cone base pressed into the wheel. A small torque was said to project from the tips of the cone and was bent on assembly to serve as a lock. [redacted] 25X1 they were about 120 mm long. [redacted] The maximum thickness of the blades was about 8 mm /and the rotor and stator blades were of the shape shown in Enclosure (D)./ The rotor blades had a twist. I do not know what material was used in the blades but believe rotor and stator blades were the same. During machining, they appeared to be the color of brass and after machining they were stored in acid baths. Some of the machinists made rings from the blade stock for their children. [redacted] 25X1 The only difficulty encountered with turbine blades was when an engine would run more than 200 hours. Then a blade would occasionally break or tear loose with the failure occuring at the root of the blade.

(5) Normally, the turbine guide vanes were fixed to the outer casing by means of a weld. However, one engine had guide vanes that were adjustable. A series of tests were run to determine the optimum blade angles.

(6) In the spring of 1950, Engines No 15 - No 22 were modified to incorporate graphite rings to seal off the gap between the rotor blades and the casing. The graphite ring was made up of a series of small blocks 40 x 25 x 6 mm. /See Enclosure (D)./ These blocks were inserted into a steel ring and protruded about 0.8 mm from the steel ring enclosing the turbine wheel. The graphite blocks were slightly tapered and fitted into a similarly tapered slot in the ring. To insert the blocks, a notch was machined into the ring where the blocks entered the groove and were worked around the ring until an entire ring of graphite was formed. [redacted] 25X1 Each ring was bolted to the adjacent stator ring.

(7) The clearance between the rotor blade tips and graphite was supposed to be between 0.6 and 0.8 mm at the start of a test. I was not aware of clearance measurements taken after each test. Occasionally, on shut down of the engine when the wheel was rotating freely, a scraping noise could be heared that was probably the blades scraping the graphite. Also, at times during a test, a blade would strike a block and the carbon dust could be seen in the exhaust. This would be followed by a slight increase in fuel consumption. The engine would then be stopped and repairs made.

(8) Vibration measurements were generally taken during a test. Frequently, the vibration would become excessive and cause a stoppage for the purpose of rebalancing the wheels.

 [redacted]

Standard measurements taken were:

T_6 - Temperature of exhaust leaving turbine taken at four points around exhaust outlet.
P_6 - Wall static pressure.

25X1

(9) The maximum temperature permitted for T_6 was 560° C. At cruise speed of 7150 rpm, this temperature generally read 480° C. Occasionally, T_6 was permitted to rise to 600° C when the test engineer approved.

13. Tail Pipe Assembly

The exhaust pipe was a 15 mm thick single sheet of stainless steel, formed and welded. There was no insulation wrapping on the pipe. Its maximum diameter was 850 mm and its length varied with each set of tests. An exhaust cone was supported in the center of the pipe by means of five struts. The exhaust cones had two predominant shapes. One was tapered to a point, while the second was truncated with an opening at the end. Occasionally during the test, the entire assembly would be rotated at 45° intervals. Instrumentation of the tail pipe consisted of a four tube total head rake, referred to as P_8.

14. Transmission

[redacted] On Stand No 3, the prop shaft was connected directly to the water brake. 25X1

15. Engine Bearing

[redacted] Bearing temperatures were measured in early tests but only on the first four engines. There was only one bearing failure [redacted] This was what was referred to as a compressor turbine bearing. 25X1 25X1

16. Starters

[redacted] none were used with the engines [redacted] where an electric motor connected to the water brake was used to turn up the engine on starting. On the prop stand, compressed air starters were used until the spring of 1949. At that time a change-over was made to a turbo starter and was mounted over the combustion section of the engine. This starter was referred to as the "TS" starter. It was developed at Kuibyshev by the German engineers and was supposedly based on an American design. The "TS" starter was started itself by an electric motor and was brought up to a speed of 8000 rpm. At this speed a clutch was engaged which drove a shaft that extended from the clutch to the gear box located on the compressor section and then extended forward on the engine to the transmission. When the engine reached the speed of 400 rpm, the ignition was turned on. At an engine speed of 2500 rpm, the starter was disengaged. 25X1

17. Fuel System

Elements of the fuel system were a pump, regulator, filter, manifold, and twelve nozzles. The fuel pump located in the lower engine accessory drive was a German commercial gear type pump made by Bramag or Bamag. Inlet pressure to the

 25X1

[redacted]

pump was .8 to 1.2 atmospheres and the outlet pressure was 2.4 atmospheres absolute. From the pump the fuel flowed through the regulator that was of the same type as the JUMO 004. [redacted] 25X1 From the regulators, the fuel passed through a high pressure filter which consisted of a copper screen and a spring-loaded ball check valve. The fuel then passed into a manifold that circled the engine and from the manifold, flexible lines led to the individual nozzles. A fuel pressure reading was taken at the manifold which was 60 to 70 atmospheres. [redacted] 25X1 A dump valve was located at the base of the manifold to release the fuel when the engine stopped. [redacted] 25X1

18. Oil System

The oil system consisted of a main gear type pump, two gear type scavenging pumps, and a booster pump. The main pump and booster pump were located in the lower accessory drive box while the scavenging pumps were located below the air inlet duct. The main oil pressure was 4 atmospheres and the booster pump produced 12 atmospheres for the operation of the compressor valves. All oil lines were first made of aluminum tubing but were later changed to steel due to occasional breakage. The largest lines were finally changed back to aluminum. The oil lines had a nominal size as follows:

To main pump	- 40 mm
From main pump to filter	- 25 mm
From main pump to booster pump	- 18 mm
From scavenging pumps to tank	- 50 mm

When the M engines were produced, all oil lines were internal. Other engines had external lines.

19. Ignition System

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The ignition system consisted of two spark plugs with a vibrator supplying the energy.

20. Propellers

[redacted] the prop assembly [redacted] 25X1 consisted of two four-bladed counter rotating hydraulically operated propellers. 25X1

21. Disassembling Procedure

The following was the procedure for disassembling the various sections of the JUMO 022 engine:

(1) Remove exhaust pipe.
(2) Remove third stage turbine wheel, guide vanes, second stage, turbine wheel, guide vanes, etc.
(3) Pull shaft extending through combustion chamber. (Special long wrench needed.)
(4) Set engine vertically, resting it on combustion chamber flange.
(5) Remove transmission.
(6) Separate two halves of compressor casing with guide vanes.
(7) Lift compressor wheel assembly upward.

This entire operation would take four well-teamed men approximately five to six hours.

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Engine Performance Data

22. JUMO 022:

/The following summary of performance data, obtained [redacted] is for the the first 22 engines of the JUMO 022 type tested at Zavod No 2./ 25X1

(1) Take off Power

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Engines No 1 - No 14 - 6000 BHP
Engines No 15 - No 22 - 7000 BHP

(2) Residual Thrust

Take off - 250 - 300 kg

(3) RPM

Take off - 7500
Rated - 7250
Cruise - 7150
Maximum - 7700

(4) Specific Fuel Consumption

Engines No 1 - No 9 - Approximately 340 gr/HP/Hr
Engines No 10 - No 14 - Approximately 300 gr/HP/Hr (Result of Gerlach's work)
Engines No 15 - No 22 - 242 gr/HP/Hr (Short chamber and graphite rings)

(5) Length

Engines No 1 - No 12 - 4700 mm
Engines No 15 - No 22 - 4500 mm (short combustion chamber)

(6) Diameter

Maximum - 850 mm

(7) Dry Weight (without starter, prop)

Engines No 1 - No 14 - 1100 kg
Engines No 15 - No 22 - 1050 kg

(8) Fuel

Kerosene - sp gr .820
Color - Golden yellow

(9) Fuel Press

Engines No 1 - No 14 - 60 - 70 atmospheres
Engines No 15 - No 22 - 70 - 85 atmospheres

(10) Oil Consumption

Not to exceed 8 kg/hr

[redacted]

(11) Oil Pressure 25X1

3.5 - 4.5 atmospheres

(12) Turbine Temperature (taken at exit of 3d stage)

Engines No 1 - No 14 - 580° C Take off
Engines No 15 - No 22 - 560° C Take off
480° C Cruise

(13) Turbine

3 stages

(14) Compressor

14 stages

(15) Combustion Chamber

Single annulus with 12 ports

23. JUMO 012B:

[redacted] 25X1

(1) Power

Take off - 1500 kg

(2) RPM

Take off - 6800

(3) Weight

1300 kg

(4) Turbine

2 stages

(5) Compressor

9 stages

(6) Combustion Chamber

8 radially

<u>Layout of Zavod No 2</u>

[redacted] 25X1

24. /Enclosure (E) is [redacted] sketch of the layout of Zavod No 2 in Kuibyshev [redacted] 7

[redacted]

<u>Point 1</u> <u>Entrance and Guardhouse</u>

<u>Point 2</u> <u>Machine Shop</u>

Point 3 Annex

a Small test stands for pumps, regulators, starters, combustion chambers, etc
b Carpenter Shop
c Heat treating room
d Forge

25X1

Point 4 Plumbing Shop

Point 5 OKB Design Offices

Two stories high

Point 6 Old Test Stands

Point 7 Old Fuel Tanks

Point 8 Transformer Station

Point 9 New Test Stands

Point 10 New Fuel Tanks

Point 11 Air Compressors

Point 12 Heating Plant

Point 13 Engine Assembly

This building was formerly used by the Askania Group. After their departure in September 1950, it was used as the engine assembly and tear down shop.

Point 14 Materials Analysis Laboratory

Point 15 Guard Towers

Point 16 Paved Roads

Point 17 Cleared Area

Originally this area was assigned for the construction of the altitude test stands, dismantled at Dessau. However, work on this project was discontinued and all associated equipment was recrated and shipped out in the period from May until September 1951. The crating and numbering of the equipment was supervised by Boelke and Groebner, both German engineers who had been in charge of the stands in Dessau.

Point 18 Wooden Fence

Six meters high. The guards stationed at the towers (Point 15), were instructed to shoot at anyone approaching within three meters of the inside of the fence.

Test Stands

25. Old Test Stands

(1) Reference is made to Point 6, /Enclosure (E)/, which locates the Old Test Stands within the compound of Zavod No 2. Construction of the stands was started in the

winter of 1946, with the last stand becoming operational in April or May 1947. All equipment was taken from the Junkers and BMW plants in Germany. There were four stands inclosed within a corrugated steel covered structure. /See Enclosure (F) which is an external view of the Old Test Stands. Enclosure (G) is a plan view, showing the relation of the individual stands and control rooms./ 25X1

(2) Cell No 1 consisted of a pendulum type stand that was converted for the testing of compressor units. It was instrumented for temperature and pressure surveys of the installed units.

(3) Cell No 2 and No 4 consisted of pendulum stands that permitted the testing of an engine with the propellers installed. The forces produced by the engine were transmitted through the engine mounts to a floating platform. Indicators attached to the platform registered the thrust and torque developed. Test procedure required the calibration of the thrust and torque indicators before and after each test. [redacted] 25X1 The State Acceptance Test and other major tests were performed within Cell No 2. Cell No 4 was used only when the other cells were occupied. The stand in Cell No 4 was sluggish and not used unless absolutely necessary.

(4) Cell No 3 consisted of a large pendulum stand that incorporated a water brake. /Enclosure (H) is [redacted] 25X1 sketch of this stand./ The engine mounts, the water brake, and an electric motor, were all mounted on a floating platform. With an engine installed and coupled to the water brake, thrust measurements were transmitted through the platform to an indicator located at the front of the stand. The torque measurements were made by means of the water brake acting on a similar indicator.

[redacted] 25X1

(5) A sketch of the control room /Enclosure (I)/ shows a typical consol with the required instrumentation and control levers. To the left of the consol are the banks of manometers associated with test stands. The fuel metering equipment, /appearing at the right of the consol/ utilized volume displacement gauges rather than weighing tanks.

(6) [redacted] 25X1 the water brake could absorb 9000 BHP-but that this was hardly the limitation since it could easily be replaced with a large brake. [redacted] 25X1 a modification was to be made in Cell No 3 in order to handle future tests in the K engine.

26. New Test Stands

Reference is made to Point 9, /Enclosure (E)/, which locates the New Test Stands within the compound of Zavod No 2. Construction was started in the spring of 1950 and was still

25X1

[redacted]

underway [redacted] in December 1951. The building, known as Building No 22, was completed and was to house four stands. Stand No 1 was completed and operational in September 1950, and Stand No 2 became operational on 7 Nov 51 when the 022M engine was tested for the first time as a coupled engine. Stand No 3 was under construction and work on No 4 had not started. A sketch, /Enclosure (J)/, shows a front view, side view, and floor plan of the New Test Stand building. The layout of the test cells was similar to that of the Old Test Stand building, with a control room separating two adjacent cells. Exhaust chimneys were located to the rear of each cell and deflected the engine gases upward. 25X1

(1) Cell No 1 consisted of a pendulum stand similar to Stand No 2 and No 4 of the Old Stands. [redacted] 25X1

(2) Cell No 2 consisted of a "gallows stand". [redacted] the 022M engine was suspended from a structure that appeared as a gallows. [redacted] 25X1 25X1

(3) Cell No 3 was to consist of a water brake stand similar to Old Stand No 3.

The front portion of the test stand building consisted of a large hall. Future plans call for the engine assembly and tear down shops to be located here. Entrance to each of the test cells from the assembly hall was possible through a passage under the control rooms. On each side of the building were a series of rooms on two floors. First floor rooms consisted of small shops of various types. The second floor were largely office space for the test engineers and draftsmen.

- end -

ENCLOSURE: (A) External view of the JUMO 022 engine

ENCLOSURE: (B) External and internal view of the JUMO 022 engine

ENCLOSURE: (C) Turbine assembly of JUMO 022

ENCLOSURE: (D) Graphite ring at turbine wheel
Profile of turbine blades of JUMO 022

ENCLOSURE: (E) [redacted] sketch of Zavod No 2 25X1

ENCLOSURE: (F) External views of old test stands

ENCLOSURE: (G) Plan view of old test stands

ENCLOSURE: (H) Old test stand No 3

ENCLOSURE: (I) Test stand control room

ENCLOSURE: (J) New test stands (Building No 22)

25X1

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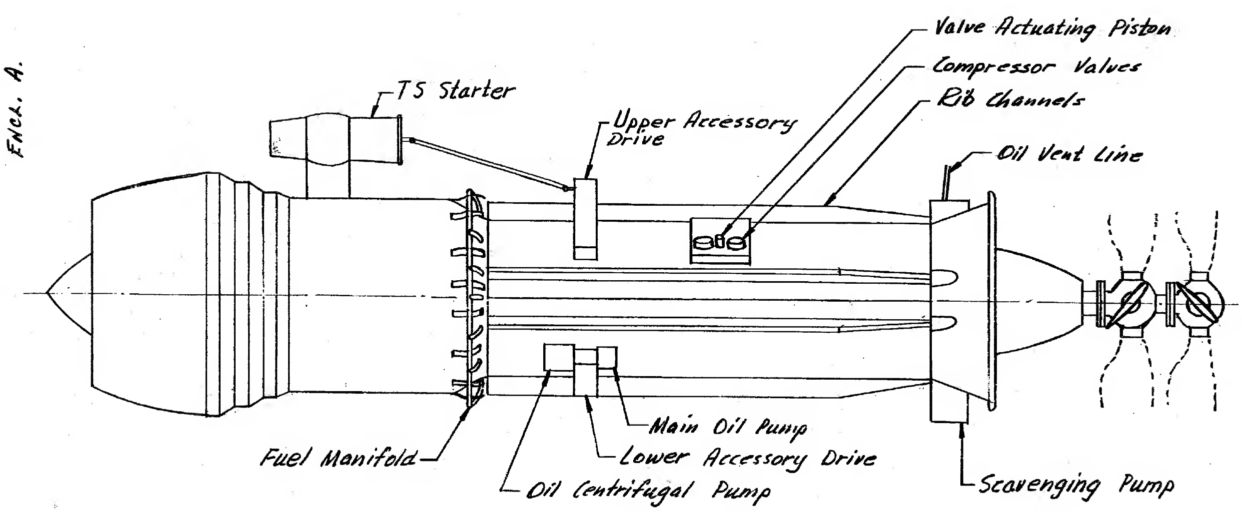
SECRET/SECURITY INFORMATION

Encl. A.

ENCLOSURE (A)

25X1



EXTERNAL VIEW of JUMO 022 ENGINE

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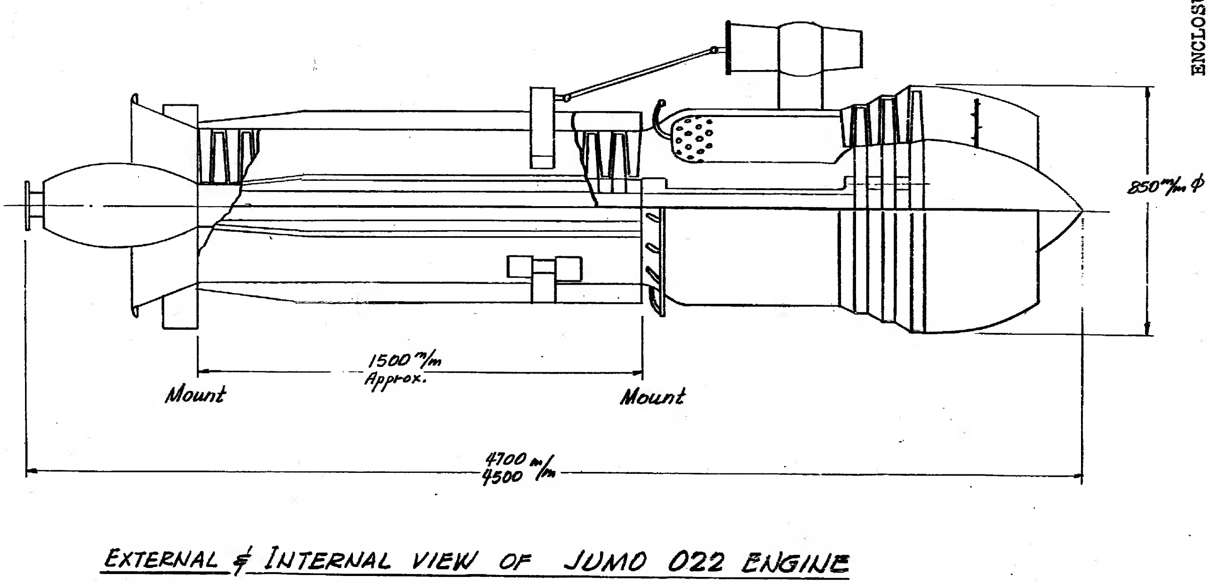
25X1

SECRET/SECURITY INFORMATION

Encl B.

ENCLOSURE (B)

SECRET



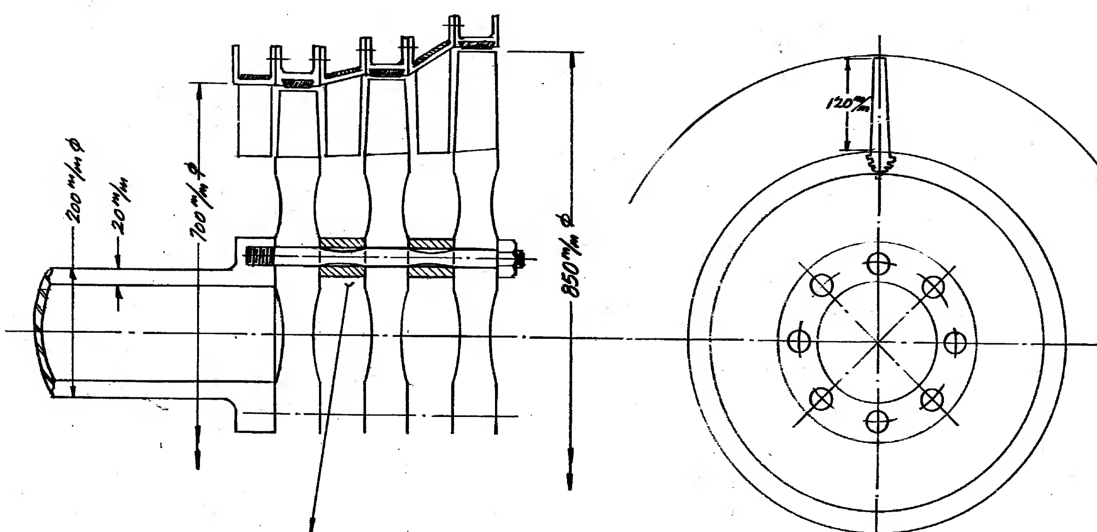
EXTERNAL & INTERNAL VIEW OF JUMO 022 ENGINE

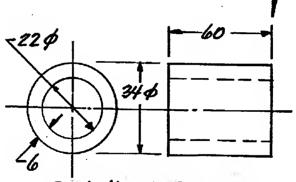
25X1

ENCL. C

ENCLOSURE (C)

SECRET/SECURITY INFORMATION





Detail of Spacer

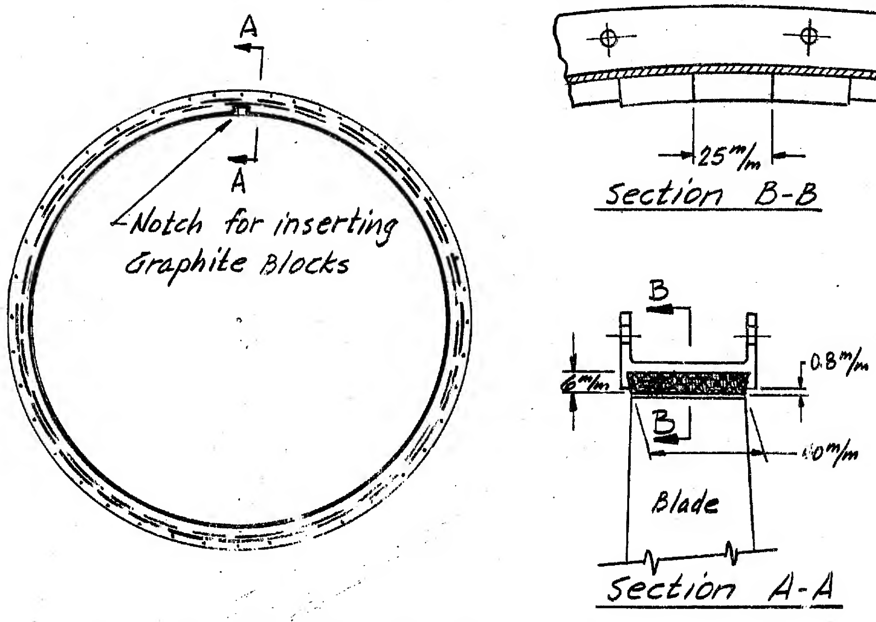
TURBINE ASSEMBLY of JUMO 022

SECRET

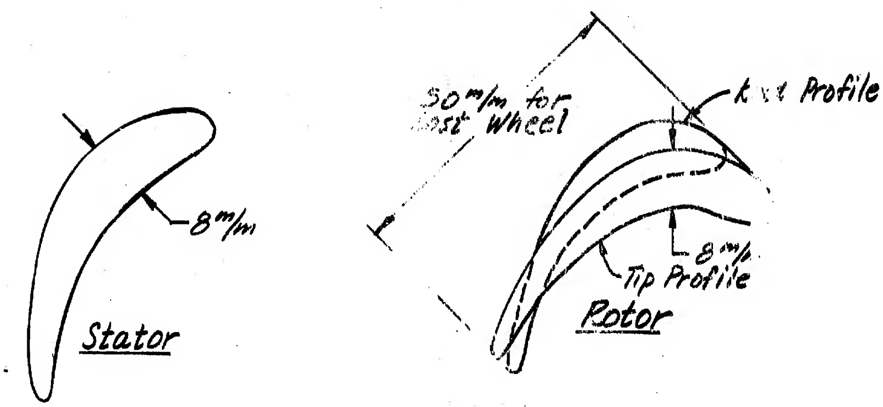
25X1

SECRET/SECURITY INFORMATION

ENCL. D



Graphite Ring at Turbine Wheel
Jumo 022 Engine



Profiles of Turbine Blades
Jumo 022 Engine

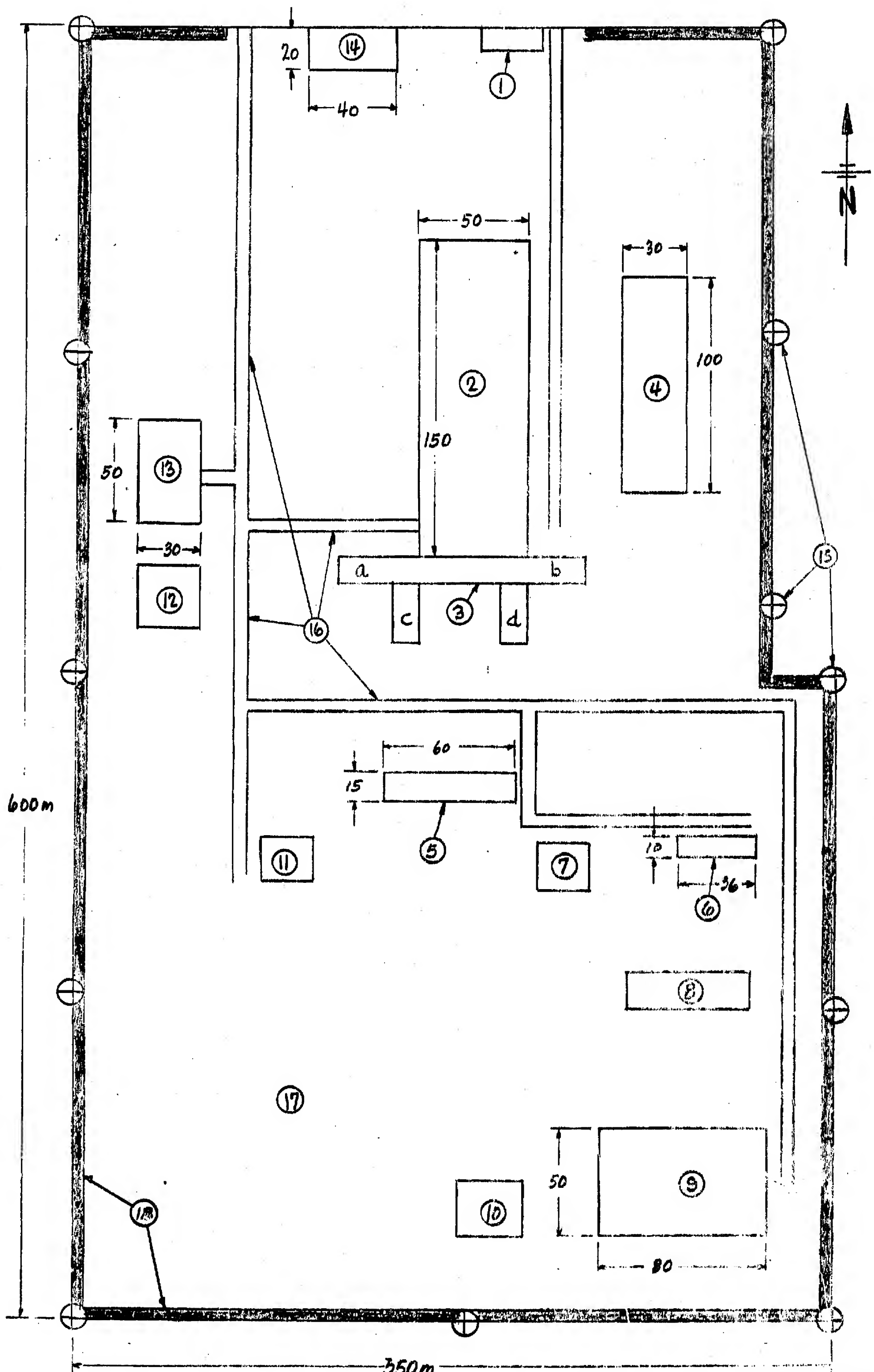
ENCLOSURE (D)

SECRET

SECRET/SECURITY INFORMATION

25X1

ENCL. E



25X1

SKETCH OF ZAVOD #2

ENCLOSURE (E)

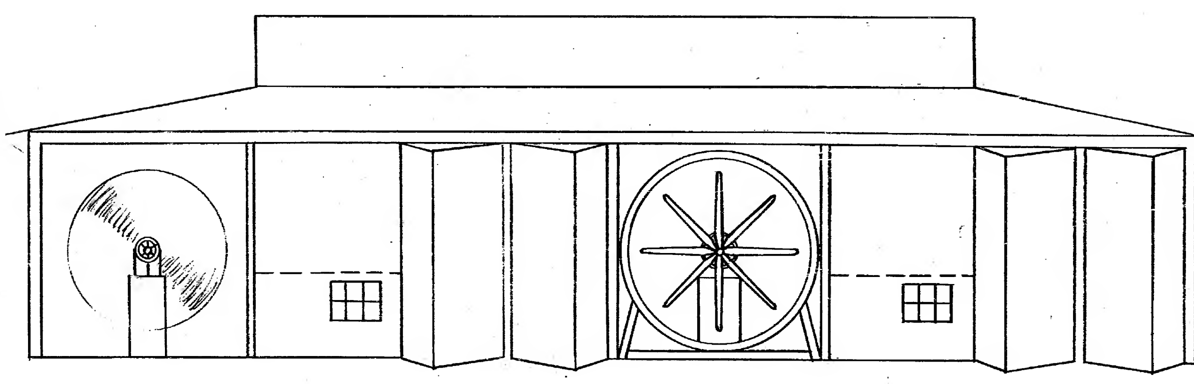
SECRET

ENCL. F

ENCLOSURE (F)

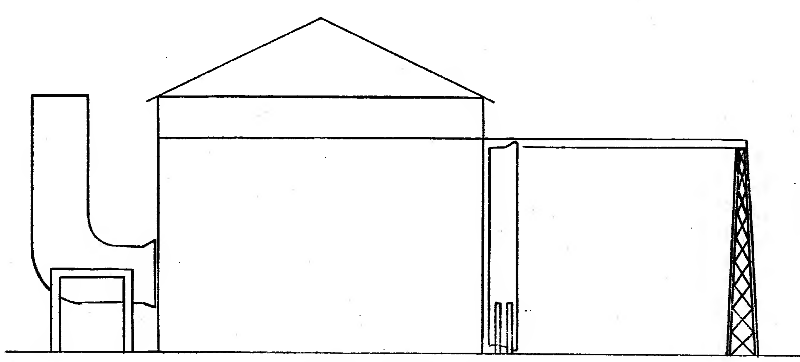
SECRET/SECURITY INFORMATION

SECRET



FRONT ELEVATION

EXTERNAL VIEWS OF OLD TEST STANDS



SIDE ELEVATION

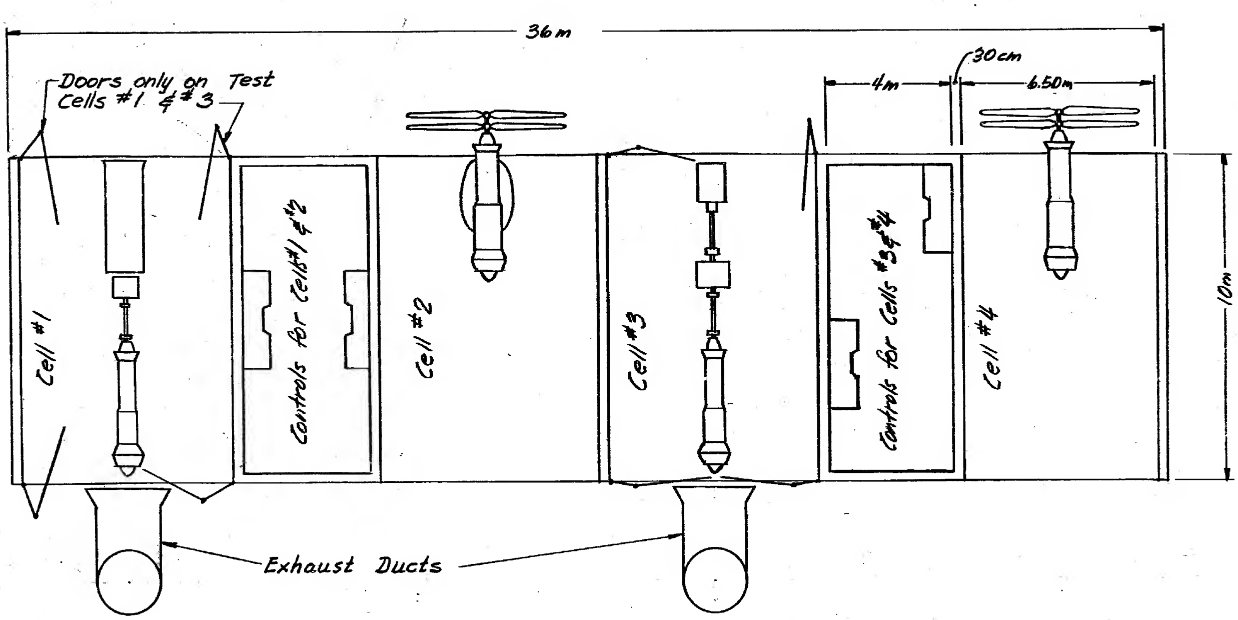
25X1

ENCL. G

SECRET/SECURITY INFORMATION

ENCLOSURE (G)

SECRET



PLAN VIEW of OLD TESTSTANDS

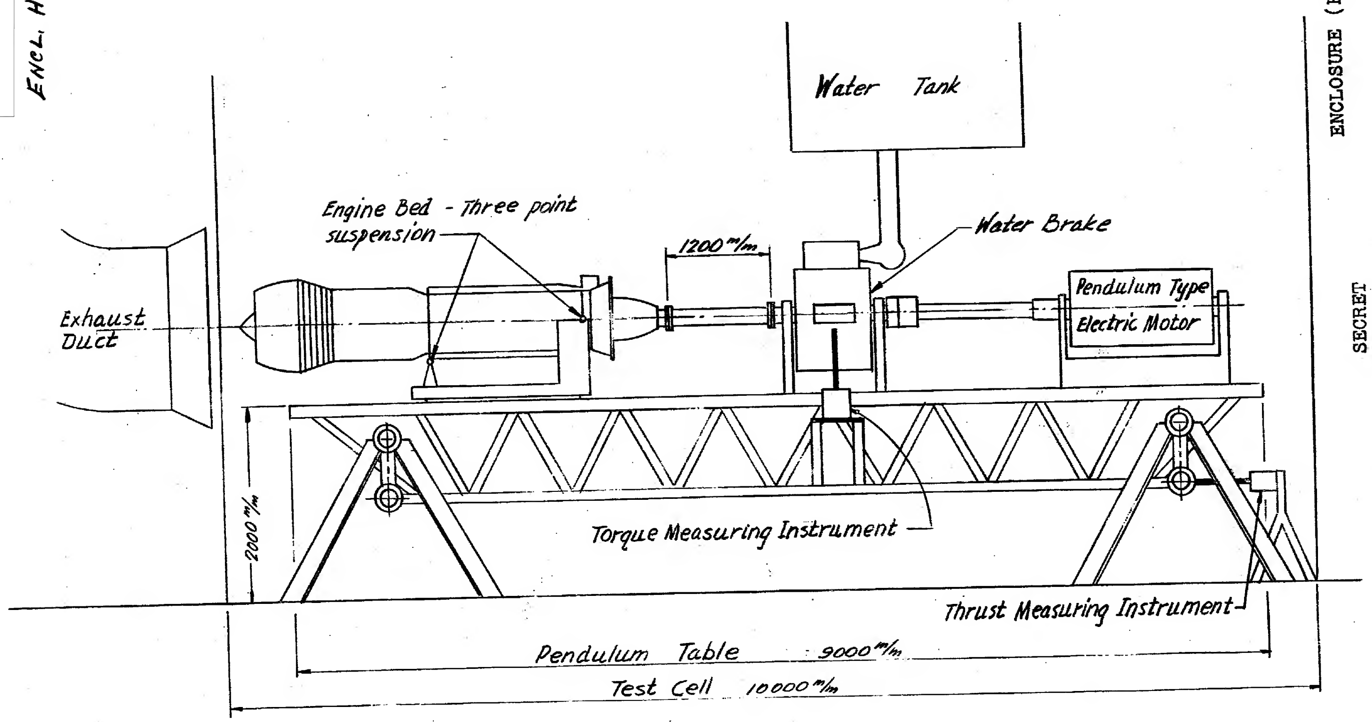
25X1

ENCL. H

SECRET/SECURITY INFORMATION

ENCLOSURE (H)

SECRET



OLD TEST STAND #3

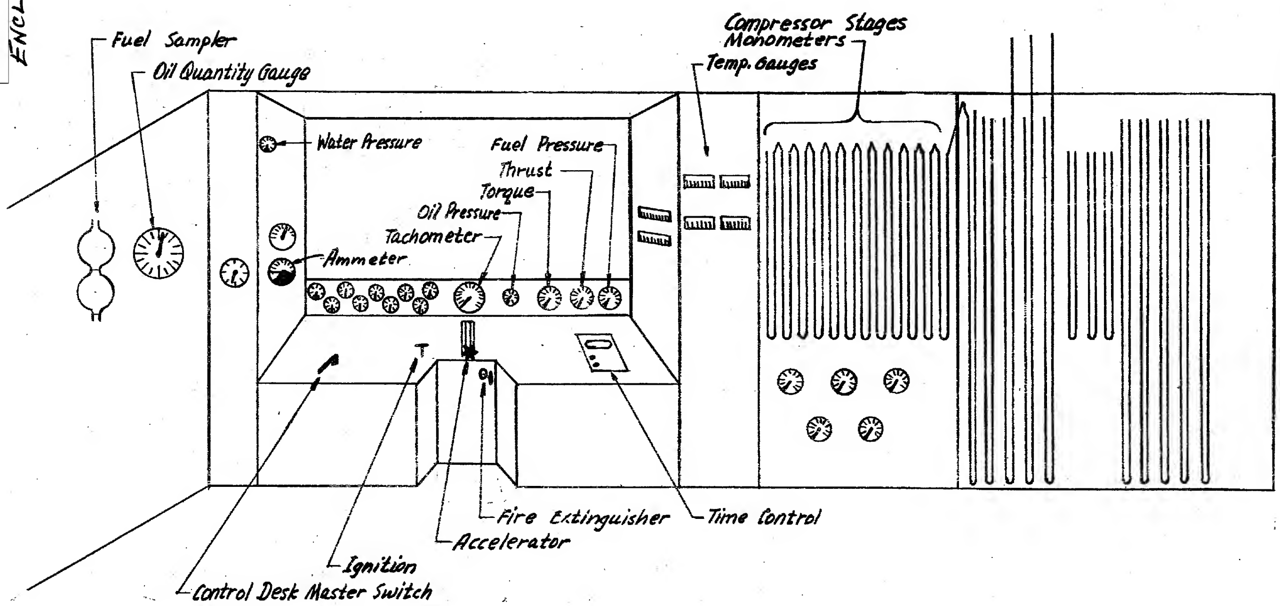
25X1

ENCL. I.

SECRET/SECURITY INFORMATION

ENCLOSURE (I)

SECRET

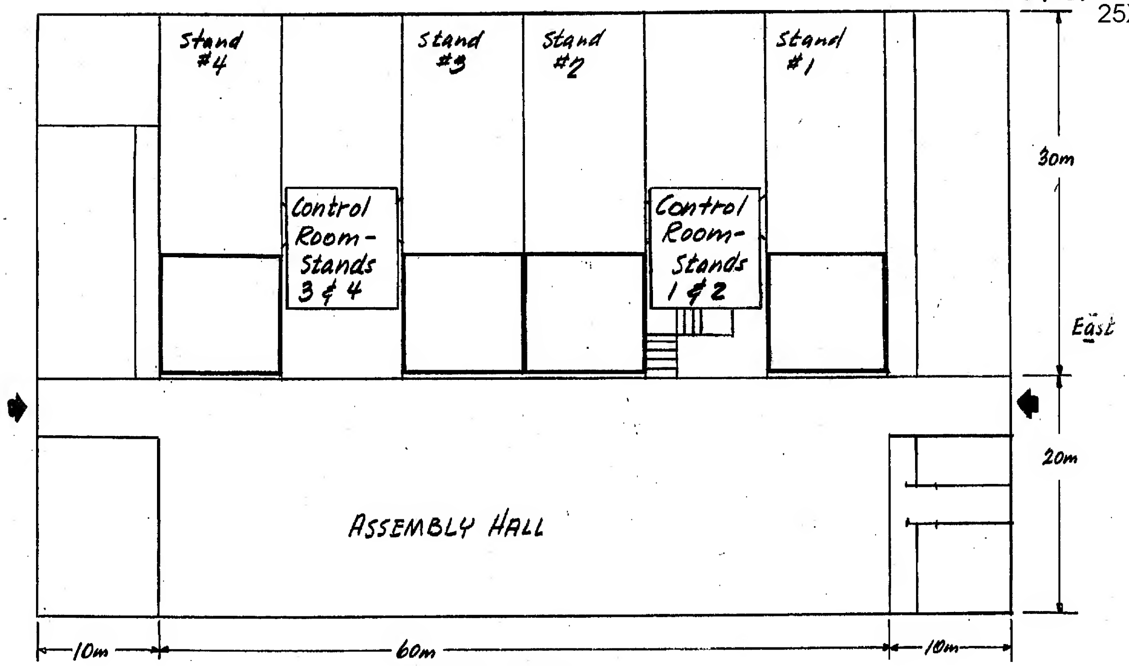


TEST STAND CONTROL ROOM

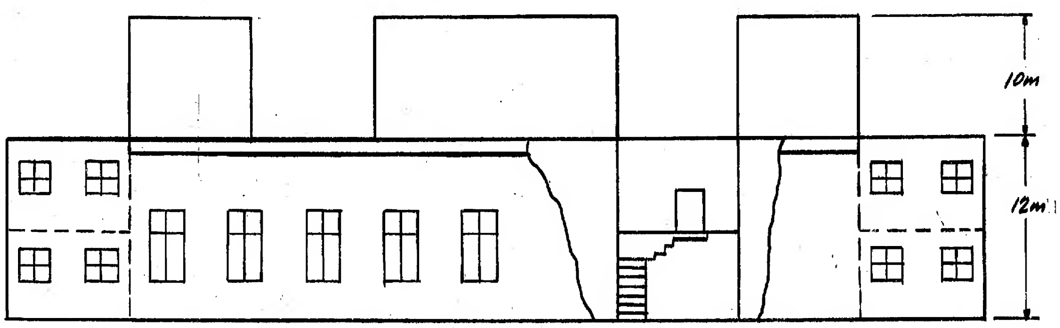
SECRET/SECURITY INFORMATION

ENCL. J

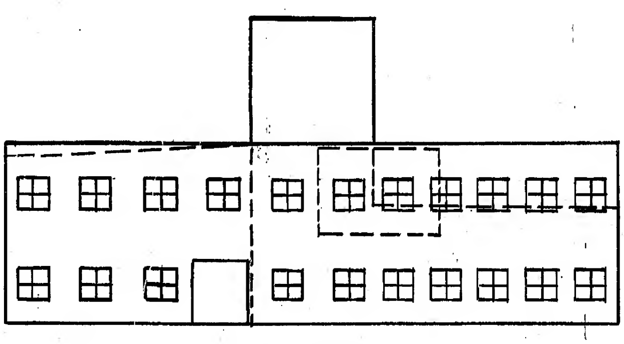
25X1



FLOOR PLAN



FRONT ELEVATION



SIDE ELEVATION

NEW TEST STANDS
BLDG. #22

ENCLOSURE (J)

SECRET